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Indicators of Achievement in College Physics

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INDICATORS OF ACHIEVEMENT IN COLLEGE PHYSICS

BY

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INTRODUCTION

This study was made to investigate some factors which might indicate a student's success in college physics. The staff of the Physics Department at South Dakota State College and this student were interested in determining if the following factors were significant in predicting achievement in college physics. It was hoped that answers to some of the following questions would be forthcoming.

1. What percent of students taking college physics took high school physics?
2. Does high school physics contribute to success in college physics?
3. Is the size of the high school a factor in determining success in college physics?
4. Can the grades received in Mathematics 16 or English 1 serve as indicators for determining probable achievement in college physics?
5. Knowing that high school rank is an important factor in college success, is rank more or less important in college physics than in other courses?
6. Is there any trend toward increased enrollment in high school physics?

Data to achieve the above were taken from South Dakota State College Admissions and Records files. The names of 50 students and five alternates were taken from grade books of Physics 20 for each year from the periods of 1950 - 1959. Each section of Physics 20 ranges from 25

to 35 students; therefore an entire cross section of names in the alphabet is included in each group of 55 students. Physics 20 is taken by all students in the engineering curricula and those majoring in professional chemistry, mathematics, and physics. For the years 1952 - 1959 or eight of the ten years included in the study, concurrent registration in Mathematics 25 was a prerequisite for Physics 20. From each student's record, grades were recorded in Physics 20, General Physics; Mathematics 16, Analytic Geometry; Mathematics 25, Differential Calculus; English 1, and high school physics. Rank of the student in his high school graduating class was also recorded. The size of the high school was recorded in the case of graduates from South Dakota high schools. It is felt that the above method for the selection of participants was sufficiently random, because the class lists were alphabetized, and no attempt was made to group the students in any manner.

The data were analyzed by the following methods: Each student's grade in Physics 20 was compared with his achievement in the other areas. These findings have been summarized in graphical form. Each student's quartile rank in his graduating class was compared with his grade in each of the courses. These findings are also summarized in graphical form. The size of the high school and grades in Physics 20 were compared. The percentage of students which took high school physics each year is recorded.

RESULTS

The findings of this study are:

1. Whether the student had high school physics or not seems to have little bearing on satisfactory completion of Physics 20. Of those who did not have high school physics, 19.5% received a failing grade in Physics 20; while 17.8% of those who took high school physics received a failing grade in Physics 20. However, there was a somewhat higher percentage of A's and B's in Physics 20 among those who had taken high school physics. The results are summarized in Figure I, which shows the distribution of grades in Physics 20 for each grade in high school physics, and also indicates grades in Physics 20 for those who did not take high school physics.

2. The graphs shown in Figures II, III, IV, and V, similar to the one mentioned above, were prepared for English 1, Mathematics 16, Mathematics 25, and Physics 20 showing the distribution of grades in these courses for each quartile rank of the high school graduating class. These graphs represent 366 students. The rank in the high school graduating class was not available for the remaining 134 students. In the first quartile there are 172 students, in the second quartile there are 107 students, in the third 68, and only 19 students in the fourth quartile. The graphs all look very much alike with the possible exception of the fourth quartile which is probably not too significant because there were so few students in this group. This seems to indicate that rank is no more important in any one of the courses tested. However, the graphs do reaffirm that rank in high school is a good indicator of

college success.

3. Receiving a high grade in Mathematics 16 appears to be a good indicator for achievement in Physics 20. Of those receiving an A in Mathematics 16 97% received a C or above in Physics 20. Likewise a low grade in Mathematics 16 is a good indication of poor achievement in Physics 20. 82% of those who failed Mathematics 16 were below a C in Physics 20. B's or D's are fair indicators, but C is of little value in predicting results in other courses. The results are summarized in Figure VI, which compares grades in Physics 20 with grades in Mathematics 16.

4. The two graphs which compare Mathematics 16 and Mathematics 25 with Physics 20 are very similar. Therefore, success in Mathematics 16 also indicates success in Mathematics 25. The results are summarized in Figures VI and VII. Receiving an A in English 1 is a reasonably good indication of a C or above in Physics 20, but it does not indicate which grade, A, B, or C, the student will achieve. The results are summarized in Figure VIII, which compares grades in Physics 20 with grades in English 1.

5. The size of the high school does not seem to make any difference as far as achievement in Physics 20 is concerned. The results are summarized in Figure IX, which compares high school size and grades in Physics 20.

6. There is no trend toward increased enrollment in high school physics for the ten year period of the study. The results are summarized in Figure X, which gives the percentage of students which took high school physics each year. The average for the ten year period is

64%. The results are summarized in Figure X, which shows the percentage of students that had taken high school physics each year for the ten year period.

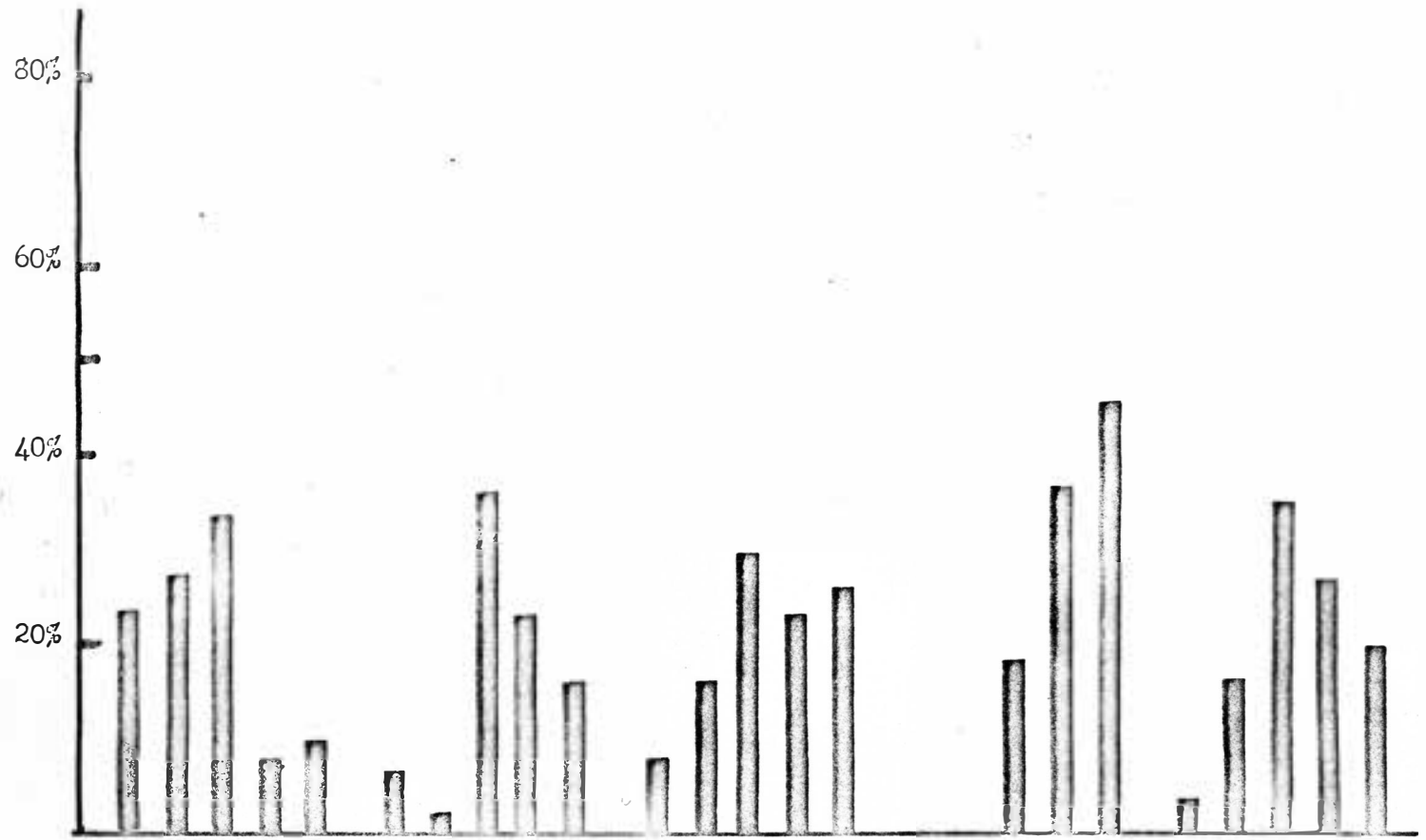


Figure I. Distribution of grades received in Physics 20 according to grades received in high school physics

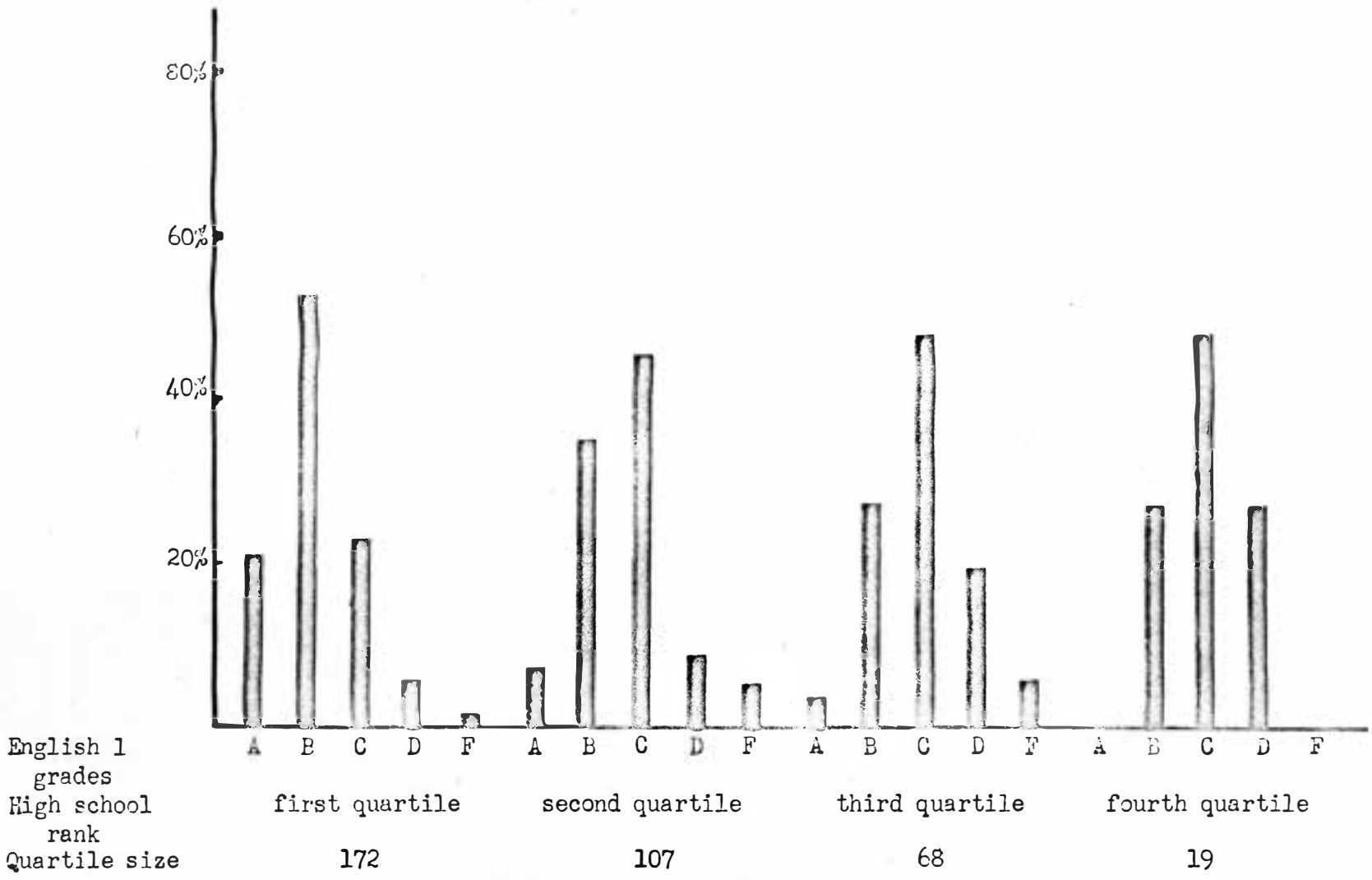


Figure II. Distribution of grades received in English 1 according to quartile rank

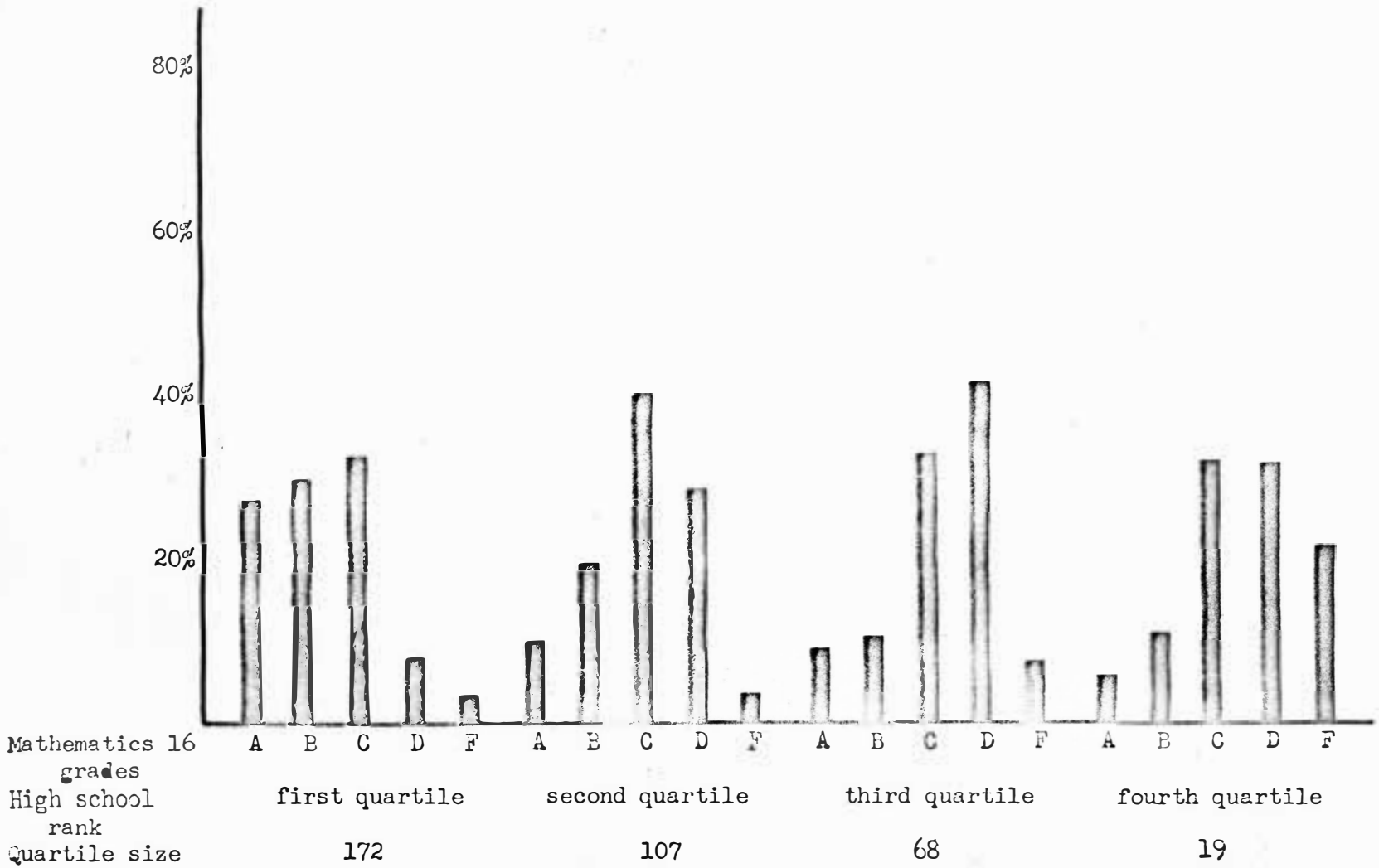


Figure III. Distribution of grades received in Mathematics 16 according to quartile rank

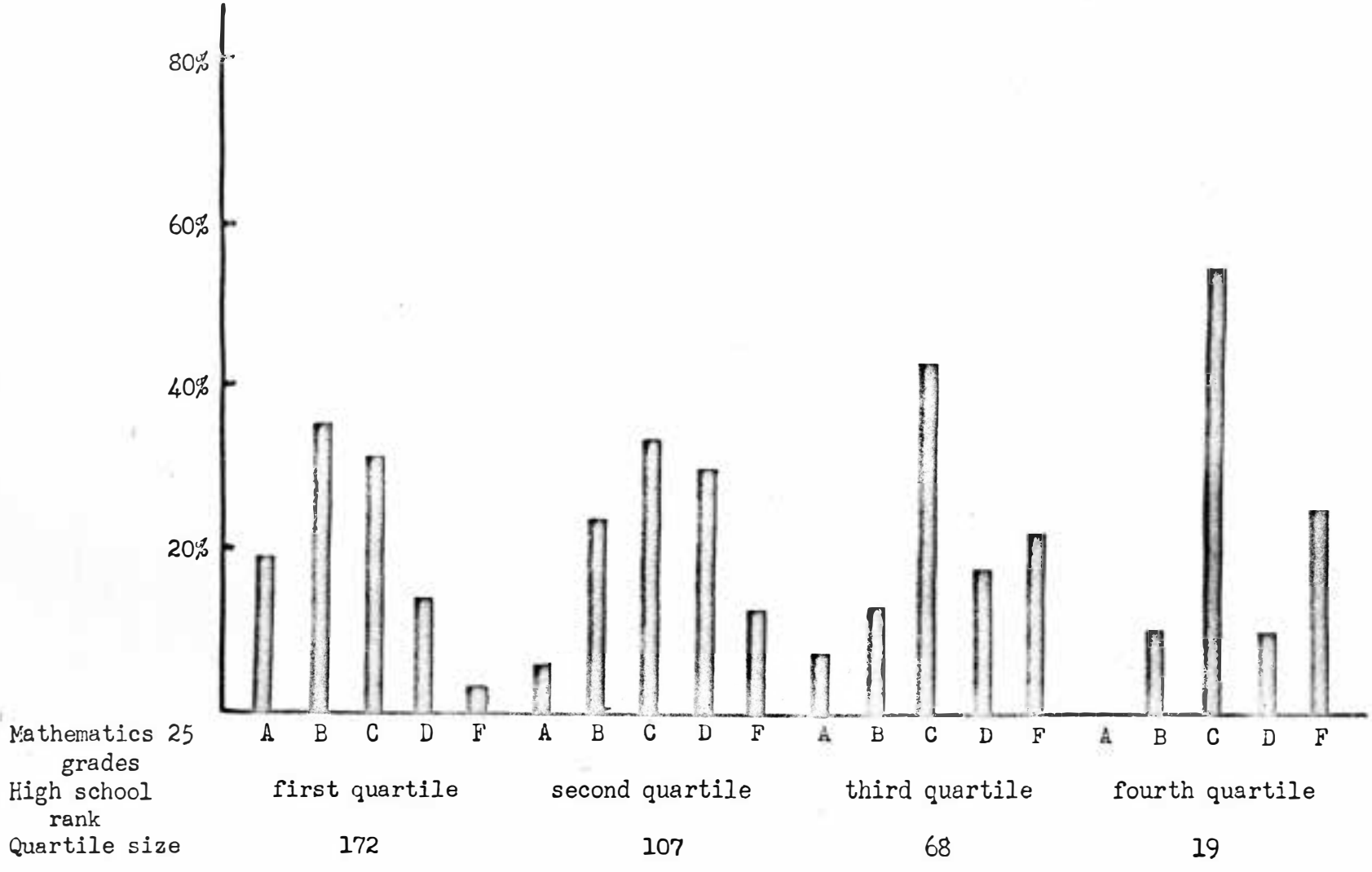


Figure IV. Distribution of grades received in Mathematics 25 according to quartile rank

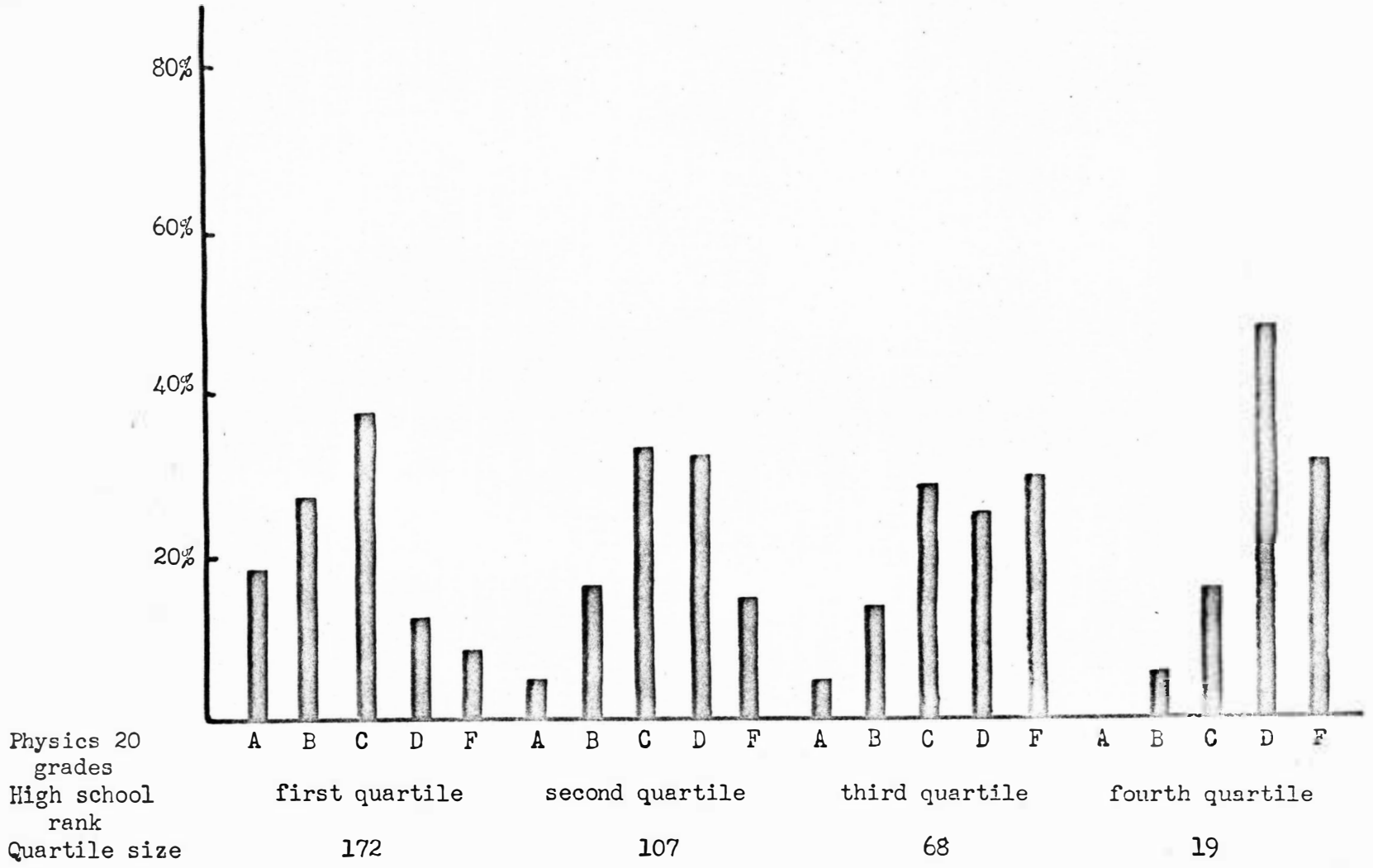
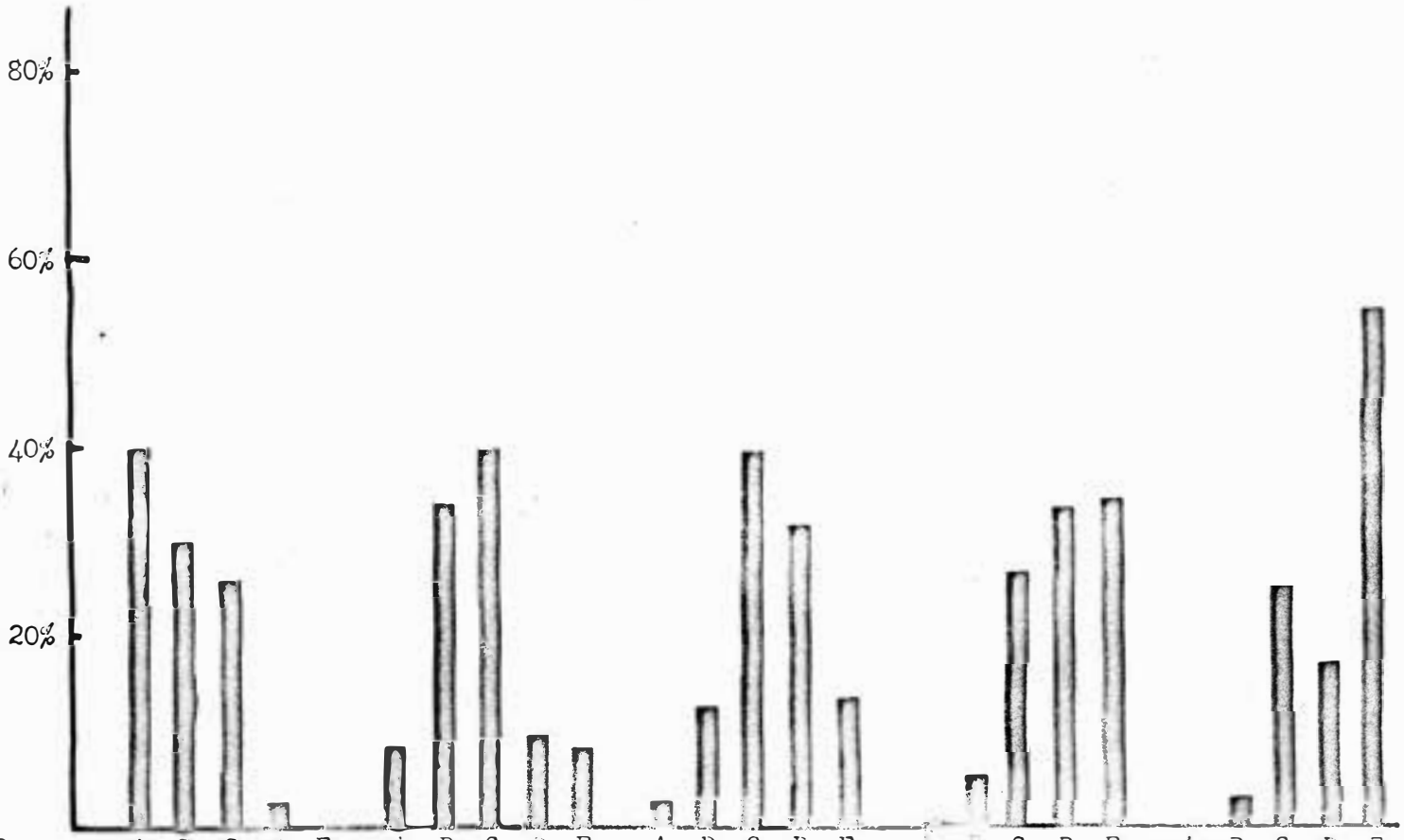


Figure V. Distribution of grades received in Physics 20 according to quartile rank



Physics 20 grades	A	B	C	D	F
Mathematics 16 grades	A	B	C	D	F
Number of students	69	111	175	110	35

Figure VI. Distribution of grades received in Physics 20 according to grades received in Mathematics 16

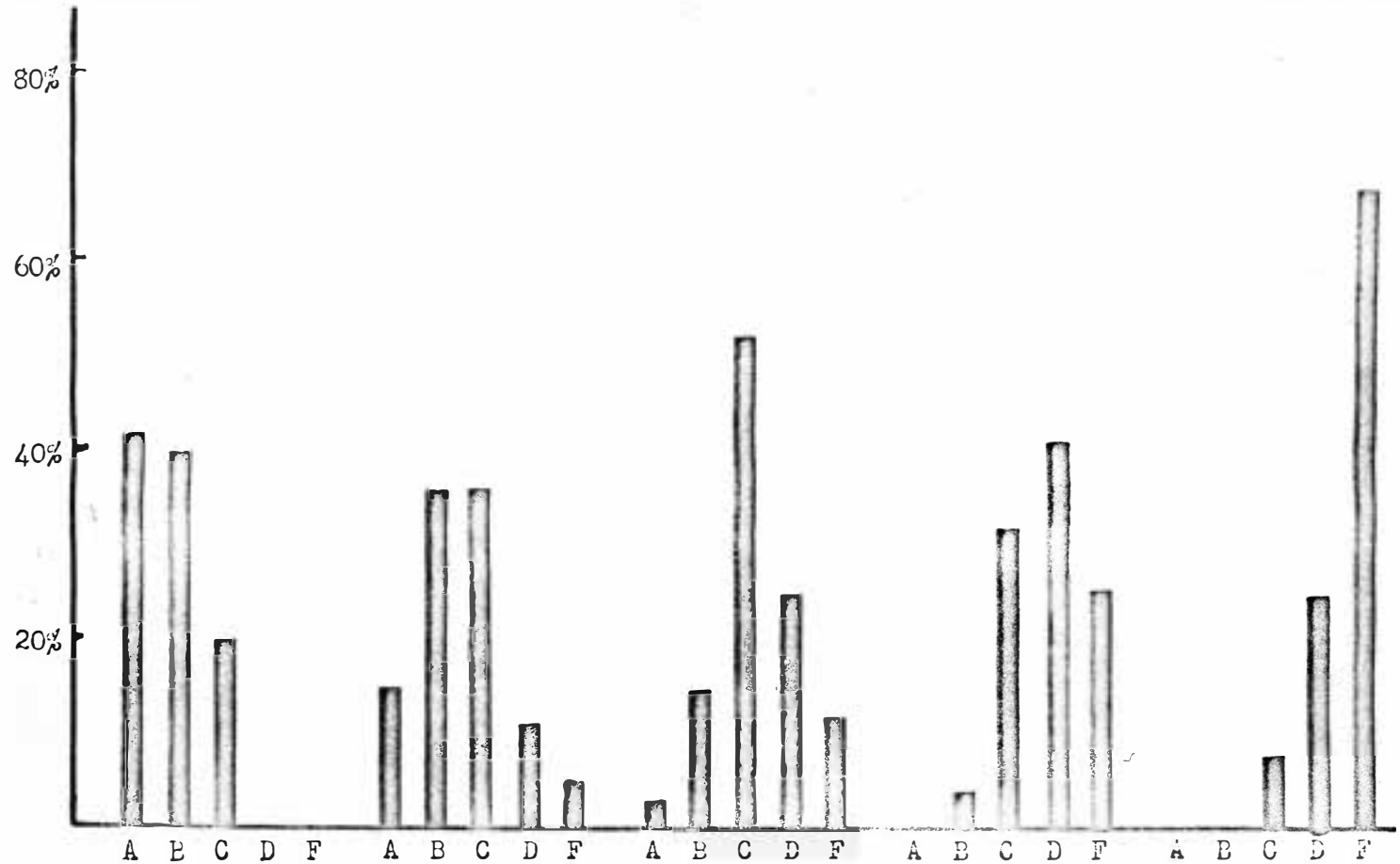


Figure VII. Distribution of grades received in Physics 20 according to grades received in Mathematics 25

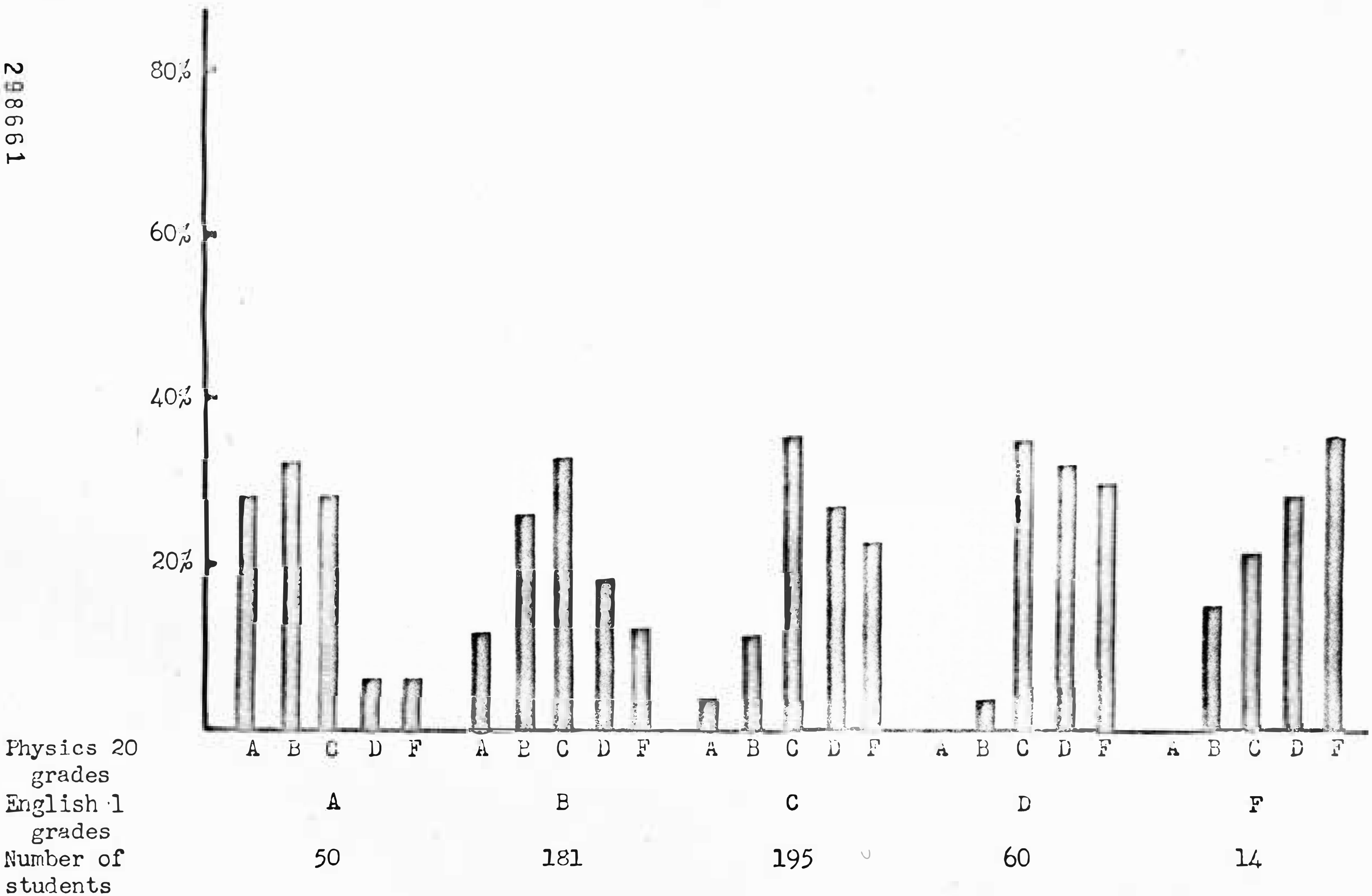
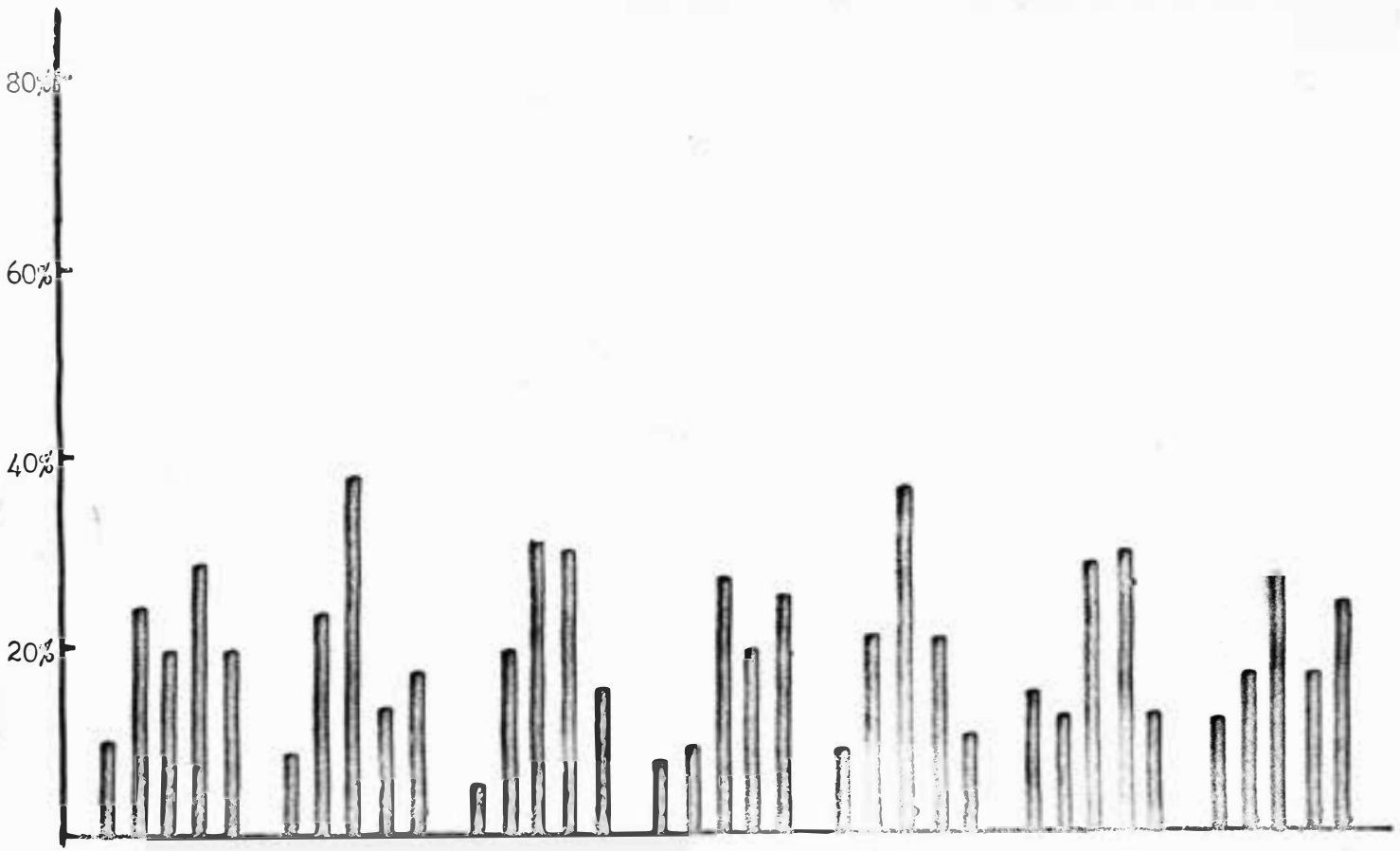


Figure VIII. Distribution of grades received in Physics 20 according to grades received in English 1



Physics 20 grades	A B C D F	A B C D F	A B C D F	A B C D F	A B C D F	A B C D F	A B C D F
High school size	1-50	51-100	101-200	201-350	351-600	601-1000	1001-
Number of students	21	74	72	65	56	39	40

Figure IX. Distribution of grades received in Physics 20 according to the high school size

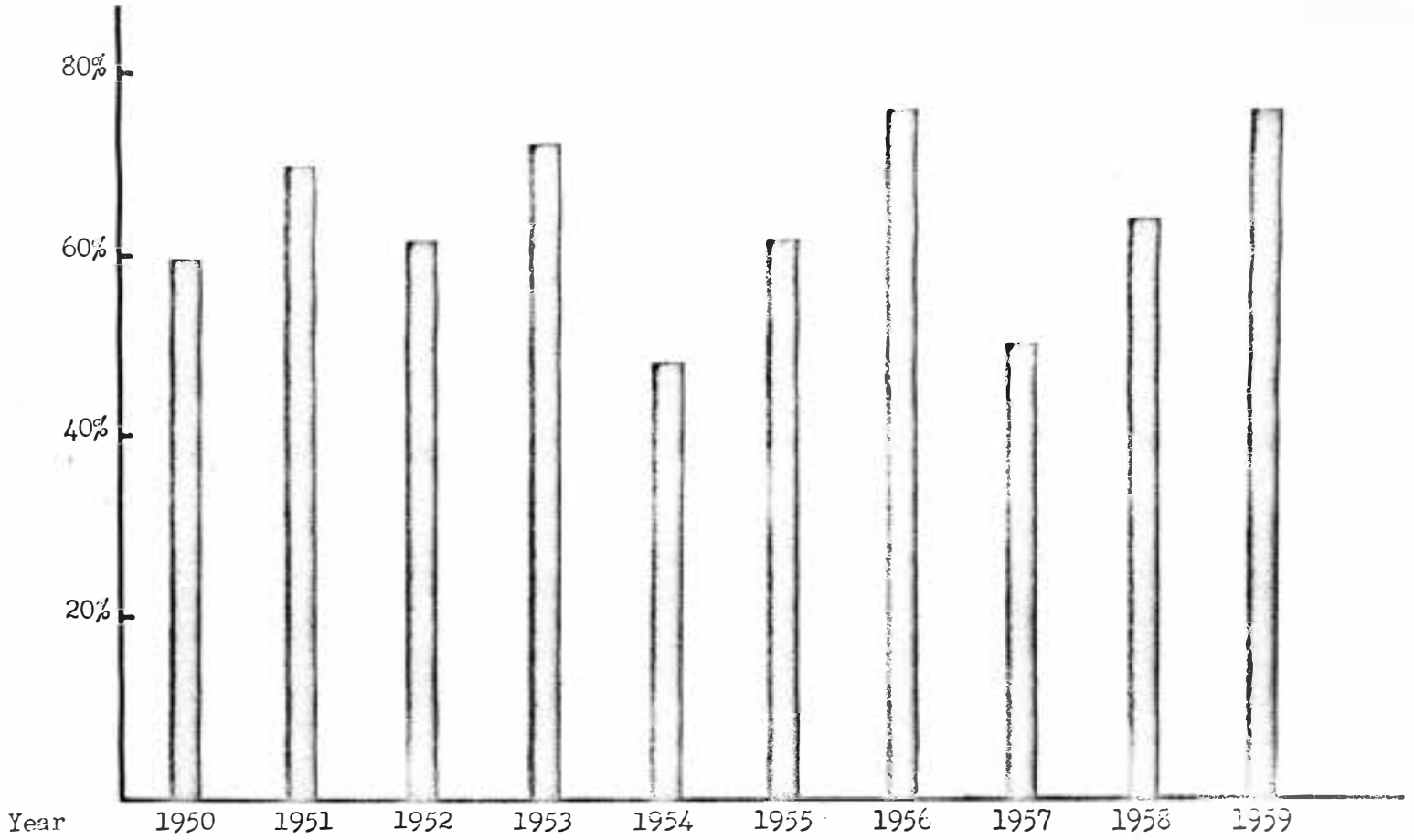


Figure X. The percentage of students each year that have taken high school physics

CONCLUSION

From these data it can be concluded that one can reasonably well predict achievement in college physics from past records. Mathematics 16 appears to be the best indicator of achievement in Physics 20. Grades in high school physics have considerable significance; although many who have not had high school physics do achieve well in college physics. Grades in English 1 are a fair indication of achievement in college physics. As would be expected, high school achievement is a good indicator of college success in all areas. However, to be able to say how any particular person will succeed is very difficult. There are so many variables to consider, many of which are nearly, if not, impossible to measure.